

# Oceans

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CHANNEL ISLANDS ♦ "SHIPS OF DISCOVERY" ♦ DECOYS ♦ BALTIC SEA



SANTA CRUZ ISLAND lies like a battleship off the coast of Southern California. In the fog, outlined in the pale light of a waning moon, it obliterates half the horizon. The outgoing tide has left shallow pools of translucent water below; the first bits of light, like chisels, pry green color from the gray sleep of a sea anemone, and flush the red spines of a starfish. You cannot see the other islands but you know they are there.

Anacapa: brown pelicans stir and blink in the hour before morning; they stretch on webbed feet, fanning the air with their wings. Santa Rosa: in the face of sea cliffs on the northwest coast the earth is still red with the cooking fires of men born 30,000 years ago. Thick, charred bones of the dwarf mammoth and thin, tiny bones of extinct birds lie near the ancient fire pits. Inland, a handful of Torrey pines, island oaks, and ironwood trees sleep in a thin fog, the last of their kind. San Miguel: far to the west, its battered face is jammed into the cold waters of the California Current. *Urocyon littoralis*, the dwarf fox, slips through an arroyo like a shadow. The sleeping wind wakes up. There is a space in time. A mouse examines a seed. A sea lion slips into the water. Morning light breaks over the Transverse Ranges on the mainland.

In the weak light the islands communicate nothing. Water washes over white sands and breaks against headlands. From the mainland they seem benignly silent, the primordial, arrhythmic pulse of the raw earth seeping from cracks as the air inflates with light

and undulates in the first warmth. From the mainland you cannot hear because it is too big out there, or you are too small, or nothing is being said. The pages of a notebook flutter on the beach. It's not science, what you've been thinking. It's what happens when you do not look at something dead-on, but glance away a little—but it bears on the truth of a thing. Without it there are only the names of things in a notebook and lines drawn on a piece of paper.

THE CALIFORNIA ISLANDS extend on a northwest-southeast axis for 500 miles—from Point Conception, west of Santa Barbara, to Point Eugenia in Baja California. The sixteen islands vary in size from 0.2 to 134 square statute miles. They share a novel collection of flora and fauna, and scientists have long considered them a unique biological unit. The eight islands to the south are Mexican, the eight to the north belong to the United States. The American islands are further divided into the Northern Channel Islands and the Southern Channel Islands. The latter include Santa Catalina, San Clemente, San Nicolas, and Santa Barbara. Anacapa, Santa Cruz, Santa Rosa, and San Miguel comprise the northern group.

Juan Rodríguez Cabrillo was the first white man to visit the northern islands, in October 1542. After a reconnaissance north to Point Reyes and Monterey Bay, Cabrillo returned to San Miguel with a badly infected arm which he'd broken in a fall during his first visit there. He died

# The Northern Channel Islands

By Barry Lopez/Photographs By Robert B. Evans



San Miguel's Cuyler Harbor, looking across to Prince Island.

The foul area of San Miguel Island, Point Bennett on the charts—home of the elephant seal.





of the injury on January 3, 1543, and was supposedly buried on the island.

The next visitor, Sebastián Rodríguez Cermeño, arrived in November 1595, and pronounced the islands "bare and sterile." He was followed by Sebastián Vizcaino in November 1602. Vizcaino's cartographer, Gerónimo Martín Palacios, was the first to provide a good map of the northern islands and the nearby coast, but white men did not visit the area again for 150 years, until 1769. By the 1790's there was general agreement on names for the islands, Spanish vanity and Catholic religious fervor having both played a part. The exception, Anacapa, was derived from a corruption of an Indian word, *Eneapah*, meaning ever-changing.

It was also in the 1790's that the great slaughter of seals, sea lions, and sea otters began. Hunters sought them mainly for their fur but the whiskers of the Steller sea lion were also in demand as pipe cleaners and aphrodisiacs. Later these animals, like whales today, were killed for dog food.

Commercial hunting continued for a hundred years and prices soared as the animals grew scarce (sea otter pelts went to \$1,700). By the turn of the century, the sea otter, the Guadalupe fur seal, and the northern elephant seal were virtually extinct in the islands and elsewhere. The population of northern elephant seals was reduced to between 20 and 100 individuals by 1890. The Guadalupe fur seal was presumed extinct until two individuals were captured off Mexico and transported to the San Diego Zoo in 1928. No more were seen until 1949, when a single male was spotted on San Nicolas Island.

George Bartholomew of the University of California at Los Angeles writes: "From our vantage point in the second half of the twentieth century, it is difficult to visualize the extent to which pinnipeds were slaughtered. The small surviving remnant of the once teeming population of fur seals is a pathetic testimony to man's rapacity and indifference to the status of mammals other than himself. The massacre of the fur seals of California was so complete that even the identity of these animals has long been a subject of controversy."

Concurrent with the commercial harvest of pinnipeds and otters during the nineteenth century was the decimation of the island-dwelling Canaliño Indians. They not only endured the white man's diseases and the missionary zeal of Spanish priests but suffered, too, at the hands of Aleut and Korean seal hunters who apparently committed rape and murder almost at will while working off ships

under English, Russian, and American flags. The last few Indians living on Santa Rosa left during a series of earthquakes in December 1812, and the last Canaliños were either dead or acculturated twenty years before the Battle of the Little Big Horn. In 1884 H. W. Henshaw, an ornithologist with the Smithsonian, spoke with the last of the Canaliños, an old Santa Rosa Indian named Anisetto Pahilacheet, who had been on the mainland for 72 years.

Fortunately, by the middle of the nineteenth century the islands had awakened the scientific interest of a number of amateur collectors. Their research provides invaluable information on island flora and fauna before the importation of domestic grazing stock.

The legendary Spencer Fullerton Baird, a vertebrate zoologist at Woods Hole and Assistant Secretary at the Smithsonian from 1850 to 1878, identified the islands' endemic dwarf fox in 1857 and in 1859 the endemic night lizard, *Klauberina riversiana*, from specimens sent to him by amateur naturalists. In 1853 J. D. Dana reported the now well-known biogeographic break between northern and southern marine fauna that occurs at Point Conception. Charles Melville Scammon visited in 1874, the year his book, *The Marine Mammals of the Northwestern Coast of North America*, was published. C. H. Townsend first visited the islands on January 7, 1889. At the same time the islands received considerable attention in at least two lengthy reports, the U.S. Army Engineers *Annual Report* of 1876 and the ninth *Annual Report* of the State Mineralogist (1890) to the California State Mining Bureau.

Toward the close of the nineteenth century trained scientists began to take a strong personal interest in the islands. In 1900 W. S. T. Smith finished a topographic study. From February to June, 1901, Philip Mills Jones conducted archeological research on Santa Rosa, following up the work begun in 1873 by W. G. G. Harford and William Dall. Ornithologists, mammalogists, and especially botanists all began to comment on the number of endemic plants and animals and to argue about the origin of the islands and how long they had been there.

Geology became one of the first disciplines to firmly establish itself in the islands, having initially been drawn there by the large number of natural oil seeps that occur in the Santa Barbara Channel. In his *West of the West*, D. M. Berry wrote in 1873, "... near Santa Barbara vast quantities of petroleum rise to the surface of the sea and overspread and perfume a large area. Our recollection



The tangled forest of the giant kelp (*Macrocystis*)—Santa Cruz Island.

of good Santa Barbara will be that she was a message of peace pouring oil on troubled waters." (At this time oil vapors were thought to be therapeutic and Santa Barbara became a health resort in the 1880's.) The oil seepage continues today as does investigation of the islands' geomorphology and geologic history. The area is under intensive development as an offshore oil field. In January 1969 it was the scene of a massive oil blowout that is still the subject of much controversy.

It was after the turn of the century that research in the islands began to assume major proportions. In 1916 the Santa Barbara Museum of Natural History was founded, incorporating the Santa Barbara Botanic Garden, which would break away from the Museum in 1932. During the twenties and thirties much of the energy to explore and preserve the islands was generated by these two institutions. Other institutions, too, were beginning to get involved. On February 18, 1939, the Los Angeles County Museum of Natural History embarked on a five-year study of the islands.

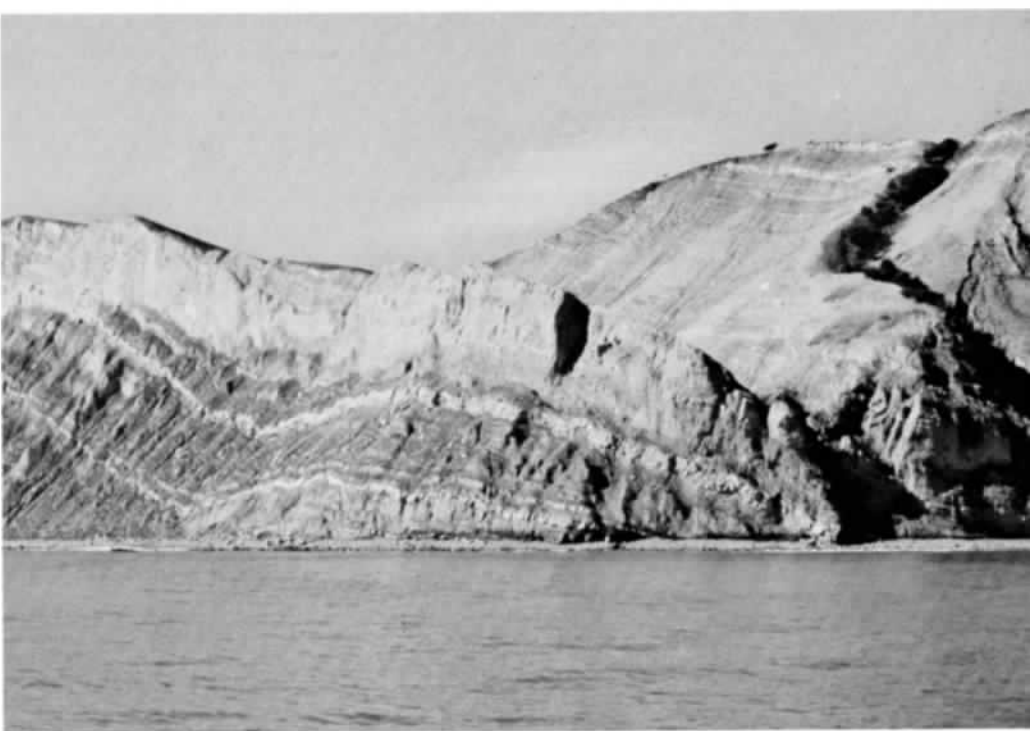
In the thirties and forties a number of individuals began making names for themselves in the islands, among them T. D. A. Cockerell of the University of Colorado, an island specialist. In 1938 Phil C. Orr of the Santa Barbara Museum began a 35-year study of archeological sites from which would come his noted *Prehistory of Santa Rosa Island* in 1968. By 1956 Orr had uncovered 160 prehistoric village sites and had completed the excavation of more than 200 burials in ten different cemeteries. Ralph W. Chaney and Herbert L. Mason were writing on Pleistocene flora, after being told by Santa Cruz's owner, Frederick F. Caire, of fossilized Douglas fir lying in alluvial deposits on the west side of the island. Willis G. Hewatt had begun work with the littoral fauna on Santa Rosa, C. St. J. Bremner's research on the geology of the islands was well-known, and Jack

C. von Bloeker had begun his study of terrestrial mammals.

Before 1900 island visits usually lasted only one or two days. Later, scientists camped for weeks and eventually months. Methods of collection seem gross by today's standards; in 1939 von Bloeker took 111 of over 300 lump-nosed bats from one building on Santa Cruz.

By the mid-fifties the Channel Islands were known to scientists around the world through the work of such men as marine biologist Carl Hubbs of the Scripps Institution, paleobotanist Daniel Axelrod of UCLA, and paleontologist/archeologist Orr, who later established man's presence on the islands at 30,000 B.P. Clement W. Meighan of UCLA had begun his anthropological work and George Bartholomew had started his pioneering work with pinnipeds. Jay Savage of the University of Southern California had initiated work on the islands' herpetofauna. Important work in taxonomy, evolutionary genetics, divergent and relictual endemism, the mechanics of biological migration, and ecology would be undertaken, as well as pioneering work in identification of insects. The incredibly clear waters around the islands would afford underwater researchers excellent opportunities for the study of sublittoral flora and fauna. The unique mixture of Subarctic, Central Pacific, and Equatorial waters offshore would, together with their indigenous fauna, make the islands extremely attractive to marine biologists. By 1972 there would be over 2,500 titles in the scientific literature relating to the Channel Islands.

THE NORTHERN CHANNEL ISLANDS were once an extension of the Santa Monica Mountains, one of Southern California's present Transverse Ranges. In the late Pleistocene the eustatically rising sea and local tectonic effects, such as faulting and warping in the Santa Barbara Channel, combined to separate the Anacapan peninsula from the mainland. This is generally dated at a period "between a few hundred to about 100,000



Sandstone Point, Santa Cruz Island—a great spot to see and study the geological formations.

years ago." The northern islands remained interconnected until the sea began to rise again following the close of the Wisconsin Ice Age, 18,000 years ago. Perhaps 12,000 years ago the four discrete landmasses of Anacapa, Santa Cruz, Santa Rosa, and San Miguel came into being. Later Anacapa became the present trio of closely linked islets. Today each island enjoys a climate, flora, and fauna slightly different from those on the other three.

Orr and others have divided man's occupation of the islands into four distinct phases. The earliest residents, going back 30,000 years, were Pleistocene men, known by a few tools and barbecue pits in which they roasted the islands' dwarf mammoth and ate abalone. There is far more evidence for the last three cultural phases: Dune Dweller, Highlander, and Canaliño.

The Dune Dwellers occupied the islands' beaches about 7,000 years ago, when the climate was hot and dry and the ocean thirty to sixty feet lower than it is today. As the climate became moister, roughly 5,000 years ago, the Dune Dwellers gave way to the Highlanders. Forests replaced sand dunes on the high marine terraces capping the islands and the inhabitants moved inland. They lived in round huts sunk in the ground and fared well on an abundance of acorns, seeds, roots, and berries. They did some fishing, and a unique circular fishhook dates from this period. About 3,000 years ago the Highland culture had begun to give way to the Canaliño culture, as the climate grew drier and the forests disappeared under the sand dunes. The Indians gave



School of blue rockfish (*Sebastes mystinus*)—Santa Rosa Island.



up their vegetable diet, moved to the beaches, and constructed thatched huts with domed roofs supported by whalebone and driftwood posts. They also built rugged, seaworthy canoes by sewing boards together with grass rope and caulking them with asphalt. It was these Indians and their domesticated dogs who came out to meet Cabrillo's ships in 1542 and who faced the muskets of the Aleut hunters with crude stick weapons in 1790.

When white men took over, they introduced sheep, goats, cattle, pigs, rabbits, rats, elk, cats, deer, and a number of other animals. They deliberately imported some plants and inadvertently transported others, and the islands suffered under the impact. Livestock overgrazed much of Santa Cruz, Santa Rosa, and San Miguel and to judge from the earliest botanical records succeeded in eliminating a number of plants. This biological abuse continued into the twentieth century, when the islands' private owners sought to control overgrazing, repair some of the damage, and do what they could to insure the preservation of the islands' biological heritage. At present, cattle are still being raised on Santa Rosa and Santa Cruz, but most other livestock has been eliminated. The sheep, from which the island fox caught scab in 1927, are slowly being hunted down. The owner of eighty percent of Santa Cruz, Dr. Carey Stanton, has instituted an effective program of biologi-

cal protection that has become a model of rehabilitation. San Miguel, which is uninhabited, still supports a few wild burros. Anacapa has no grazing animals.

Botanists say the island flora is recovering and that overgrazing has not caused an inordinate amount of damage. The prickly pear cactus, which quickly replaced overgrazed grasses and by 1938 had taken over approximately forty percent of the range land on Santa Cruz, was brought under biological control in the 1940's. It was, by the way, the first successful attempt at entomological weed control in North America.

Oddly, biological destruction of the sort that began in the early 1800's is part of what makes the islands valuable today. Dr. Peter Raven of Stanford writes that "the distinctive flora have, not surprisingly, been most susceptible to the activities of European man, his weeds, and grazing animals, and thus provide models for the destruction of island biota which is occurring all too rapidly over the entire surface of the globe." With such models it is possible to understand and perhaps control biological destruction.

Commenting in a similar vein, algologist Michael Neushul of the University of California at Santa Barbara says that one of the most important reasons for completing a thorough study of the rich tidal pools, kelp beds, and other sublittoral flora and fauna in the northern islands is to have a basis for comparison in the very likely event of their biological destruction by various forms of pollution.

THE MAJOR REASON the Northern Channel Islands have drawn and will continue to draw the attention of scientists is that they are continental islands, because of several factors the most exciting of nature's outdoor laboratories. Their ecosystems tend to be simpler and more complete than those on the mainland; therefore, they are much easier to work with. Also, like the more remote sections of this country's military reservations, they represent land which has been less disturbed by man's technological advances. In the case of the Channel Islands, some recent geological history destroyed by the advance of civilization on the mainland—e.g., the destruction of Pleistocene pavements by farm machinery—can be "re-created" with the help of island records. Continental islands, in other words, tend to preserve records destroyed on the mainland. Finally, the Northern Channel Islands are accessible. These floral/faunal museums are usually less than a day's journey by boat.

The northern islands, like most conti-



The cabezon (*Scorpaenichthys marmoratus*), a bottom fish, resting on a bed of anemones—San Miguel Island.



Large bottom rockfish (*Sebastes*)—San Miguel Island.



The Garibaldi (*Hypsypops rubicundus*), one of California's most colorful fish—Anacapa Island.

The graceful gorgonian sea fan (*Lophogorgia chilensis*) swaying in the current—Anacapa Island.









Wind-eroded sandcasts of ancient dune plants on San Miguel.

mental islands, are distinguished by a small number of endemic plants and animals. The most distinctive—the dwarf mammoth, *Mammuthus exilis*, and the giant mouse, *Peromyscus nesodytes*—are both extinct. Today the most remarkable faunal endemic is the island fox, *Urocyon littoralis*, represented by a different subspecies on each island. There are also a number of subspecific endemic animals, including a shrew and bats. The deer mouse, *Peromyscus maniculatus*, is represented by a subspecies on each of the four islands. The big-eared harvest mouse, *Reithrodontomys megalotis*, has evolved a subspecies on Santa Cruz, as has the spotted skunk, *Spilogale gracilis*, on both Santa Cruz and Santa Rosa. Among the birds only the Santa Cruz jay, *Aphelocoma coerulescens*, stands out. There are no endemics among the islands' few reptiles. Yale entomologist Charles Remington is presently sorting out the endemic insects, arachnids, and myriopods.

The haul-out beaches on the western end of San Miguel are occupied at various times by the California sea lion, *Zalophus californianus*, the Steller sea lion, *Eumetopias jubata*, the harbor seal, *Phoca vitulina*, the northern elephant seal, *Mirounga angustirostris*, and the Guadalupe fur seal, *Arctocephalus philippii townsendi*. Both the northern fur seal, *Callorhinus ursinus*, and the sea otter, *Enhydra lutris*, are often found offshore. Such a mixture of seals and sea lions occurs nowhere else in the Pacific so close to a populated shore.

The most obvious floral endemics are the ironwood tree, *Lyonothamnus floribundus*, and the island oak, *Quercus tomentella*, both of which are relictual endemics (species which have been eliminated from the mainland habitat and which survive on the islands; divergent endemics arise on the islands on which they are found). Raven notes there are seven floral species and varieties endemic to Santa Cruz, and three on Santa Rosa. There are no known floral taxa endemic to San Miguel or Anacapa, though the four northern islands share thirteen floral

species, subspecies, and varieties that are found nowhere else.

Robert F. Thorne of the Missouri Botanic Garden has found that the herbaceous plants in the Channel Islands have a tendency toward more prolonged growth, continuous or near continuous flowering, woodiness, and, in some cases, gigantism. According to island authority Sherwin Carlquist, this is to be expected on oceanic islands and to a lesser extent on continental islands. In fact, among the island animals the mice, the skunk, and the Santa Cruz jay are all slightly larger than their mainland counterparts. The fox is smaller than its presumed counterpart, the gray fox, *Urocyon cinereoargenteus*, but it may be more closely related to a smaller species of fox found in Central America.

Island animals tend to lose their fear of man and to begin to fill niches that, on the mainland, would be occupied by other species. The island fox, for example, with no natural enemies and little competition (there are no raccoons or possums), is barely wary of man. The Santa Cruz jay behaves much like a mainland thrasher. Because there are no thrashers on the islands, it fills the ecological niche the thrasher normally fills as well as its own. Dennis Power, director of the Santa Barbara Museum and an ornithologist, points out, too, that the Santa Cruz jay has a larger bill, darker coloring, and larger legs and feet than the mainland scrub jay. Such developments, say island specialists, are to be expected among birds who have severed all connections with the mainland and who find themselves in an environment where niches normally filled by birds on the mainland are empty.

Although it is often overlooked, the sublittoral shelf of any island is apt to harbor a biota as unique as that on the dry part of the island mass. This is not really true of the Northern Channel Islands since there are few sublittoral endemics, but the underwater shelf around the islands is extremely rich. Ichthyologist Alfred Ebeling of UCSB points out that not only are the northern islands to be considered unique for the extreme clarity of their waters and for the richness of their tidepools, but because the waters off their shores also harbor a large and diverse array of Equatorial, Central Pacific, and Subarctic fauna in close proximity to each other.

The cool California Current, which flows south along the California coast, hugs the mainland until it reaches Point Conception, where the southward-tending coastline swings abruptly to the east. The current continues more or less south at an increasing distance from the main-

(Opposite page) The complex sand-dune ecosystem of San Miguel.

(Below) Diver peering into an under-sea cavern of Santa Cruz.







land shore. The inland waters, where the islands are located, are warmed by a northward-flowing, shore-hugging California Counter Current. Add to this gyre an eastward-flowing current from the mid-Pacific and a continuous upwelling of cold, nutrient-rich water, and the result is a rare set of oceanic conditions in a relatively confined area.

Adding to the scientific attractiveness of the waters are perhaps the finest giant kelp beds in the world and the presence of a unique continental borderland. This borderland contains a series of underwater basins which provide a nearshore, deepwater habitat for deep-sea animals. Also, because it lies offshore from the continental shelf and inshore of the continental slope, this borderland is extremely important to geologists studying plate tectonics and continental drift.

A final note on the islands' aquatic environment is provided by Adrian Wenner, a population biologist at UCSB presently studying marine crustacea on Santa Cruz Island. He points out that Santa Cruz's sheer cliffs and small coves create isolated beaches and so provide for neatly delineated communities. These communities can be compared to each other, but, taken together, they also provide a counterpoint to the more or less continuous strip of littoral life on the mainland shore.

A REVIEW of the literature of scientific research in the islands over the past 100 years reveals much that would be

expected in the patient and painstaking examination of an island habitat. There is the excitement generated over a new-found species, the sadness when a species previously collected can no longer be found. But there are, too, a number of things which make scientific research in the Northern Channel Islands stand out. Among the more obvious would be Orr's evidence of early human habitation. A less obvious example is the relationship that grew up between the islands' private owners and those who came for research. Reading the literature, one is struck by the cooperation between them. It is a tradition that has, thankfully, carried down to the present.

In 1965 geologist Donald Weaver of UCSB and Dr. Carey Stanton got together to plan a permanent research station on Santa Cruz. Today the Santa Cruz Research Station functions as an island base of operations for scientists in almost every discipline and is headquarters for most island research. Small fees of three dollars a night for a bed and five dollars a day for jeep rental cover most costs. Dr. Stanton provides electricity and water. Another research station, one especially suited to the needs of marine biologists, is being planned on Santa Cruz. Dr. Stanton's generosity and the good will of the U.S. Navy, which provides scientists with transportation on its thrice-weekly trips to the island, make up for a certain tightness of funds where some scientific research is concerned.

Similar but less formal arrangements

for research personnel exist on Santa Rosa. The National Park Service, which administers San Miguel and Anacapa, has been more selective in aiding various scientific projects.

The bulk of scientific work is done on Santa Cruz, the largest and most rugged of the four islands and the richest in animals and vegetation. Currently under way are the usual projects concerned with identification and analysis but, as has been the trend, more and more work is being done in areas to which islands are particularly suited—evolutionary genetics, population dynamics, and the ecology of isolated systems. According to Lyndal Laughrin, supervisor of the Santa Cruz Research Station, the most work remains to be done in geology, entomology, and archeology. (Laughrin's own work is with the island fox and he was instrumental in getting it placed on the California Fish and Game's Rare and Endangered Species list in May 1971.)

Sherwin Carlquist, writing in *Bio-science*, says that in spite of his having just completed his third book on island ecology: "I have been impressed with the number of topics on which I could report nothing meaningful because we lack information." Although Dr. Carlquist is talking primarily about oceanic island biology, much of what he says applies to the Channel Islands. For example, "...despite the wide and intriguing ranges in morphology seen in insular genera, we don't have any ecological observations on most of these...." And again, "...the reason for some notable gaps in our knowledge ... is probably that most forays take the form of collecting trips, rather than observation sessions.... Labels on most specimens of island animals and plants are, to be kindly euphemistic, models of brevity.... If we are to understand the adaptive radiation in a group, we must understand its ecological requirements and habits rather thoroughly."

At the end of his article, Carlquist enunciates an important plea: "The future may well scorn today's biologists not for failing to be activists in the cause of conservation, but for failure to study endangered organisms while they are still extant." Carlquist and others have remarked on the problem of increasing destruction as pothunters, untrained amateur scientists, vandals, road builders, and land developers begin to find their way to previously isolated environments.

THE UNIVERSITY OF CALIFORNIA at Santa Barbara finds itself in a unique position today as far as research in island



and marine biology is concerned. It is situated on the coast, nineteen statute miles across the water from Santa Cruz. Ichthyologist Alfred Ebeling swings around in a wooden swivel chair in his office and comments, as he surveys the sparkling waters of the channel, that there is no finer place in the world to come to if one wants to study giant kelp, *Macrocystis*. Geologist Donald Weaver points out that the islands are incomparable training grounds for students in his field. Adrian Wenner sums up much of the value of the islands' proximity to the University by explaining that, although a recent grant proposal of his was turned down, he can, because of the availability of the Santa Cruz Research Station and free Navy transportation, carry out his sex ratio and sex reversal studies in marine crustacea with only a small strain on his own financial resources. Ralph Philbrick, one of the foremost authorities on the islands' plants, points out an oddity. Some of the most urgent and necessary work requiring minimal funding is not being done because small grants are more difficult to get than large ones.

It is not only UCSB, however, that benefits from the proximity of this fringing archipelago. The Santa Barbara

Botanic Garden and Museum of Natural History have been involved in the islands for many years, as have the natural history museums of Los Angeles County and San Diego, and Rancho Santa Ana Botanic Garden in Claremont, California, where Carlquist works. Six branches of the University of California, the University of Southern California, California Institute of Technology, Stanford, and other West Coast schools have been extensively involved. Added to these are the Scripps Institution, the Office of Naval Research, General Motors Defense Research Laboratories, Westinghouse Ocean Research Laboratory, and various other schools, private groups, and foundations around the country. The most extensive collection of island insects is at the Peabody Museum at Yale. Among the islands' more noted researchers outside California are the University of Illinois' Don Johnson, a geomorphologist, and Ralph de Long, presently with the Marine Fisheries Service in Washington State. De Long is perhaps the foremost authority on San Miguel's seals and sea lions.

Unfortunately, the islands' proximity to the mainland, as much as it may please scientists strapped for time and funds,

is also a factor which works against their preservation. There have been repeated incidents of vandalism involving both anthropological sites and the islands' wildlife, particularly birds and pinnipeds gunned down from pleasure boats. (A serious loophole in the California Fish and Game Code permits fishermen to shoot seals and sea lions.) Pesticides, washing down from the Santa Clara River plain, have been cited as a cause for the serious decline in the birthrate of California brown pelicans on Anacapa. Plans for developing a condominium settlement on the portion of Santa Cruz Island that Dr. Stanton does not own have been extant for seven or eight years. It is only by dint of constant patrol and extremely stiff visitor regulations that the private owners of Santa Rosa and Santa Cruz have been able to maintain the integrity of the islands. There are those who argue, logically, that the private owners' cattle and their now feral sheep are destructive, but most botanists believe that the major damage was done in the past, that now the two islands seem to be recovering. One still unanswered and thorny problem is the continued search for oil.

These and other controversies have brought the Channel Islands to the atten-



(Opposite page) Looking out of one of the many caves on Anacapa.

Anacapa Lighthouse at dusk, marking the course to the Northern Channel Islands.

Two bull elephant seals (*Mirounga angustirostris*) battling in the surf.



The wild burros of San Miguel, descendants of stock left on the island in early days.



tion of the public, and many conservationists have expressed concern for their fate. Anacapa and tiny Santa Barbara to the south already constitute the Channel Islands National Monument and the National Park Service has administrative jurisdiction over San Miguel. A Channel Islands National Park, which would include the two private islands, has been in the offing for a number of years. Most experts who have studied the proposal feel that national park status *alone* would do little to protect and preserve the islands. Perhaps the most cogent and exciting plan for their preservation is one outlined by Charles Remington in *Discovery*, the magazine of the Peabody Museum of Natural History.

Remington suggests that the eight American Channel Islands be designated the first of a series of National Scientific and Educational Preserves. Remington writes that national parks and monuments are created primarily for the enjoyment of the public and that this ignores "two problems crucial to management of the islands: 1) protecting the unique biotic communities; and 2) maximizing responsible scientific exploration of these communities and of most of the archeological remains."

Remington further states that the islands' "biotic communities are extremely fragile and even relatively little Park-style recreational development and occupancy will surely be disastrous; and the disasters will tend to be terminal."

As a National Scientific and Educational Preserve, the Channel Islands would be administered as a scientific site, says Remington, rather than as a tourist attraction. The public, or that portion of it interested in the flora and fauna of the islands or their natural history, could be more than adequately provided for in mainland museums. At present both the botanic and natural history museums in Santa Barbara offer a good look at island flora, fauna, and prehistory. There is talk of raising money to build a special island museum in the future. Perhaps it could also contain a research library and provisions for housing live specimens of the island fox, the Santa Cruz jay, and other island animals.

As Dr. Remington so accurately points out, the islands themselves possess none of the obvious attractions—cliff dwellings, geysers, alligators, glaciers, waterfalls, canyons—that bring people to national parks. Indeed, the average tourist would likely be bored wandering the



An intricately designed spider web—Anacapa Island.

steep, chaparral-covered slopes of Santa Cruz and hard put to find the difference between them and the mainland. The islands' major visual attraction, the pinnipeds of San Miguel, would likely disappear under the pressure of tourism.

The fate of the islands—whether they are to continue as a preserve for scientific research and an outdoor classroom for university students, or whether they are to be given over to condominium development, oil wells, pothunters, and vandals such as those now scouring and destroying much of Southern California—will likely be decided in the very near future.

ON A WALK through the Santa Barbara Botanic Garden's Channel Islands section, Ralph Philbrick, who organized the first scientific symposium on the islands in 1965 and who has just finished the definitive book on the plants of Santa Bar-

bara Island, talks at a rapid clip about the flora of the Channel Islands, including the complex taxonomic differences in the island plants. He points out the succulent, *Dudleya traskiae*, last seen in a wild state on Santa Barbara Island in 1968. It was eliminated by introduced rabbits, which have also destroyed much of the island's stands of giant coreopsis.

On a visit to San Miguel a very businesslike geologist, Don Weaver, allows there is a certain magic to that island. Later, in his office, he will talk animatedly about radiogenic dating, the ebb and flow of abstract concepts in the history of science, and, with deftness, he will create the incredible distance and space that is the matrix of geological time. He will do it with just a piece of chalk, a blackboard, his hands, and a few words.

Over lunch, Charles Remington, visiting professor at Santa Barbara for a term, talks of the Santa Cruz jay and other "islands" he's worked on—the tops of mountains in the Colorado Rockies. He pauses before he answers questions. You can feel him thinking. There are impassioned and brilliant men in the sciences and he is one of them.

Whatever it is about man that makes him want to dig into the earth for ancient bones or to hold a kelp fly in his fingers, and by doing those things to somehow grow in himself, is a part of the Channel Islands. Somewhere behind the lists of taxa, beyond the slightly larger bill of the Santa Cruz jay, underneath the slightly smaller foot of the island fox, in the air between the pincers of the mole crab, there are dim quintessential truths. It is for these truths that man goes to the Channel Islands. On the edge of the ocean he encounters truths he passed a hundred years ago in a Conestoga wagon, back on the great plains, where there was no end to the land and the buffalo.

It has been said that we have mastered the art of taking everything apart. In the Channel Islands it is possible for man to begin to understand the science of putting it all back together. The land stretches before him no more.

The sloping bluffs of Brockway Point, Santa Rosa.

